Economics Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Industry, Innovation and Science Portfolio
2017 - 2018 Budget Estimates
31 May – 1 June 2017

AGENCY/DEPARTMENT: IP Australia

TOPIC: Australian Patents granted since 1990

REFERENCE: Written Question – Senator Carr

QUESTION No.: BI-131

1. Please provide a breakdown of the number of Australian patents granted every year since 1990. As part of your response, can you please include:
• Information on the type of patent;
• The field of research to which the patent applies; and
• The industrial application of the patent (for example, computer sciences, biological materials, biopharmaceutical products or medical devices etc.).
As part of your response, can you also please provide some analysis of the trends in patent numbers since 1990, for example:
• Have there been increases or decreases in the number of patents granted?
• Have there been increases or decreases in some categories of patents?
• Are there any noteworthy trends in relation to the field of research or industrial application of the patent?
2. Please provide a breakdown on the number of licensed new technologies in Australia for every year since 1990. Please include some analysis of the data, outlining the trends in licensed new technologies since 1990 (for example – the type of technology, the industrial application and applicable field of research, increases or decreases in the number of licenses etc.).

ANSWER

1. Patent information

This response considers the three questions above in order, covering a) the type of patent; b) the field of research and c) the industry sectors. For each question there is a sub-set of answers addressing individual trends.

a) Patent information

On average 14,610 patents were granted every year in Australia between 1990 and 2016. In the early 1990s, IP Australia granted less than 13,000 per year, whereas since 2011 IP Australia has granted more than 19,000 patents per annum. The increase in grants has been accompanied by an increase in patent applications.

Note that in 2001 the Innovation Patent replaced the Petty Patent system. One of the key changes was the transition from mandatory examination prior to grant to optional examination after grant. This resulted in a sharp increase in the total number of patents granted, but a decrease in enforceable rights, as innovation patents cannot be enforced until after examination. *IP Australia Economic Research Paper 05* provides more detail on the economic impact of innovation patents.[1] The breakdown by patent type is shown in Table 1.

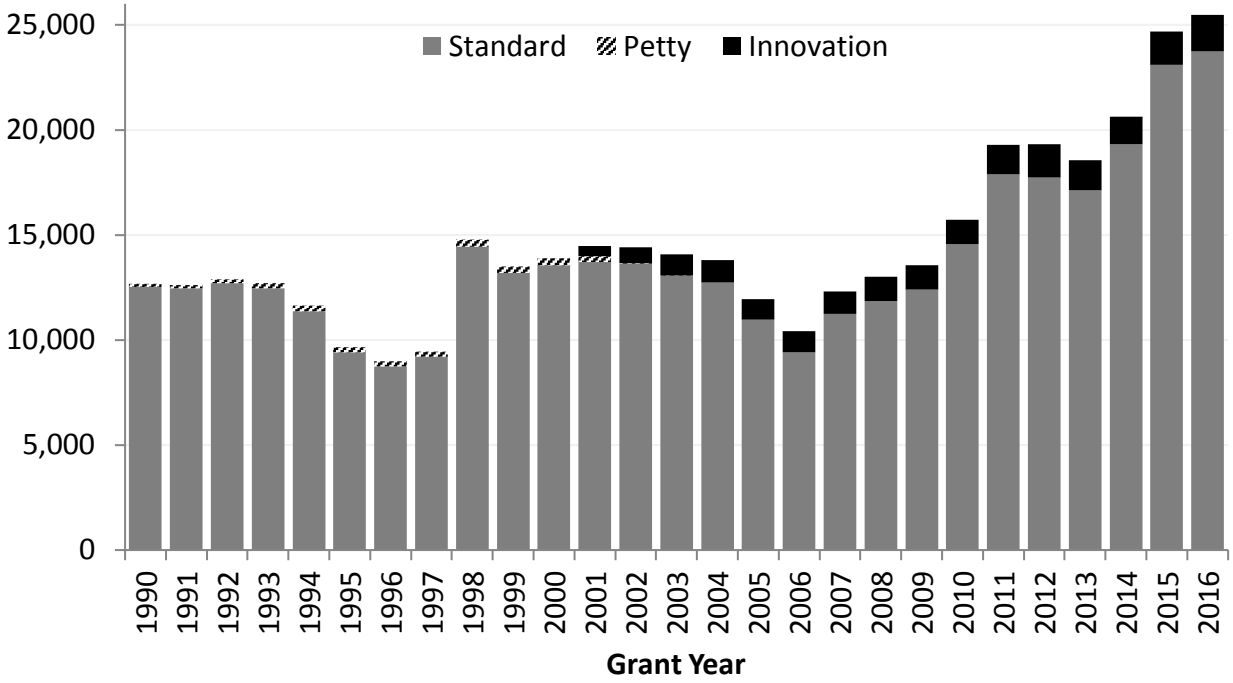
[1] https://www.ipaustralia.gov.au/tools-resources/publications-reports/economic-impact-innovation-patents

Table 1: Number of granted Australian patents by patent type, 1990-2016

Grant year	Innovation		Petty		Standard		Total
	Resident	Non resident	Resident	Non resident	Resident	Non resident	
1990	0	0	127	32	1,041	11,469	12,669
1991	0	0	117	32	966	11,506	12,621
1992	0	0	137	43	889	11,815	12,884
1993	0	0	192	61	968	11,488	12,709
1994	0	0	202	72	1,025	10,353	11,652
1995	0	0	193	55	869	8,537	9,654
1996	0	0	169	54	826	7,928	8,977
1997	0	0	159	81	804	8,400	9,444
1998	0	0	204	107	1,170	13,280	14,761
1999	0	0	213	89	1,003	12,200	13,505
2000	0	0	251	98	1,034	12,514	13,897
2001	438	68	187	79	1,070	12,633	14,475
2002	644	106	34	5	980	12,632	14,401
2003	876	142	1	1	1,021	12,035	14,076
2004	913	156	0	0	1,177	11,562	13,808
2005	798	153	0	0	1,163	9,816	11,930
2006	831	159	0	0	924	8,502	10,416
2007	883	195	0	0	1,086	10,150	12,314
2008	901	248	0	0	925	10,938	13,012
2009	938	212	0	0	926	11,484	13,560
2010	878	297	0	0	1,178	13,379	15,732
2011	963	465	0	0	1,261	16,611	19,300
2012	990	607	0	0	1,311	16,413	19,321
2013	933	513	0	0	1,110	16,002	18,558
2014	812	522	0	0	1,199	18,105	20,638
2015	906	672	0	0	1,614	21,484	24,676
2016	969	755	0	0	1,433	22,310	25,467
Total	**13,673**	**5,270**	**2,186**	**809**	**28,973**	**343,546**	**394,457**

Trends: The number of granted patents was steady between 1990 and 2009 with an average of 12,538 patents granted per year. From 2009, there has been a positive trend, which is also observed for patent applications, with an average 10 per cent growth rate per year from 2009 to 2016. Analysing the data by patent type, the positive trend is mainly driven by an increase in standard patent grants from 2011, as illustrated in Figure 1.

Figure 1: Number of granted patents in Australia by patent type, 1990-2016



b) Field of research / technology field

Patents are classified into technologies through the International Patent Classification (IPC) system.[2] The World Intellectual Property Organization (WIPO) provides a concordance from IPC to 35 broad technology fields which allow us to analyse granted patents' field of research/type of technology.[3] A breakdown of patents granted by IP Australia between 1990 and 2016, by technology field, is listed in Table 2.

Table 2: Number of granted patents in Australia by technology field

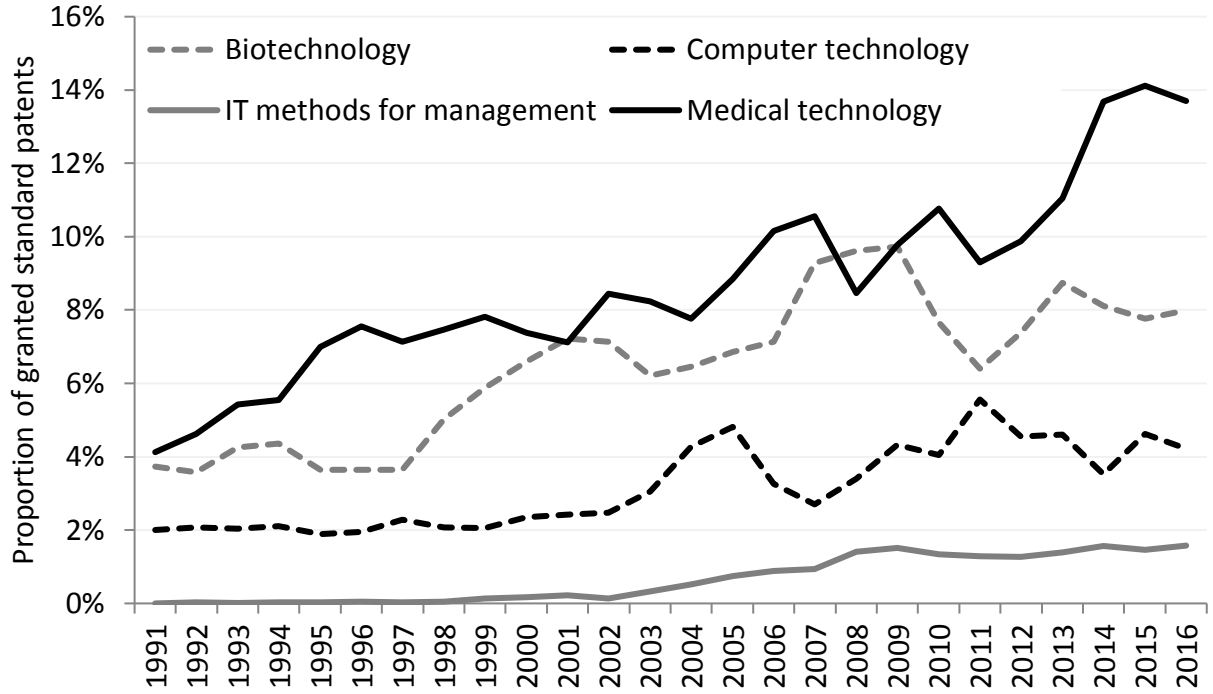
Technology field	Innovation	Petty	Standard	Total
Medical technology	689	109	34,101	**34,899**
Organic fine chemistry	96	9	32,218	**32,323**
Pharmaceuticals	276	24	27,883	**28,183**
Biotechnology	58	6	24,699	**24,763**
Civil engineering	2,473	485	18,150	**21,108**
Basic materials chemistry	228	29	15,208	**15,465**
Other special machines	944	222	13,356	**14,522**
Handling	1,040	178	13,260	**14,478**
Computer technology	896	94	12,768	**13,758**
Chemical engineering	297	70	12,919	**13,286**
Measurement	400	45	12,755	**13,200**
Furniture, games	2,174	404	10,284	**12,862**
Transport	1,444	241	10,319	**12,004**
Electrical machinery, apparatus, energy	1,137	118	9,919	**11,174**
Telecommunications	243	56	9,715	**10,014**
Materials, metallurgy	129	19	9,098	**9,246**

[2] See http://www.wipo.int/classifications/ipc/en/ for the latest IPC information
[3] See Schmoch, U. 2008. "Concept of a Technology Classification for Country Comparison" Final report for WIPO http://www.wipo.int/export/sites/www/ipstats/en/statistics/patents/pdf/wipo_ipc_technology.pdf for an overview.

Food chemistry	164	27	8,988	**9,179**
Other consumer goods	1,248	219	7,369	**8,836**
Mechanical elements	631	127	7,782	**8,540**
Macromolecular chemistry, polymers	21	4	8,197	**8,222**
Machine tools	628	97	7,227	**7,952**
Digital communication	205	4	7,306	**7,515**
Analysis of biological materials	45	2	6,635	**6,682**
Audio-visual technology	483	103	6,094	**6,680**
Textile and paper machines	88	23	6,288	**6,399**
Optics	147	32	6,158	**6,337**
Engines, pumps, turbines	309	39	5,707	**6,055**
Surface technology, coating	131	22	5,562	**5,715**
Control	463	74	5,157	**5,694**
Thermal processes and apparatus	294	57	5,284	**5,635**
Environmental technology	274	45	5,274	**5,593**
IT methods for management	1,196	6	2,942	**4,144**
Basic communication processes	13	4	1,671	**1,688**
Semiconductors	63	1	1,493	**1,557**
Micro-structural and nano-technology	6	0	177	**183**
Unknown	10	0	556	**566**
Total	**18,943**	**2,995**	**372,519**	**394,457**

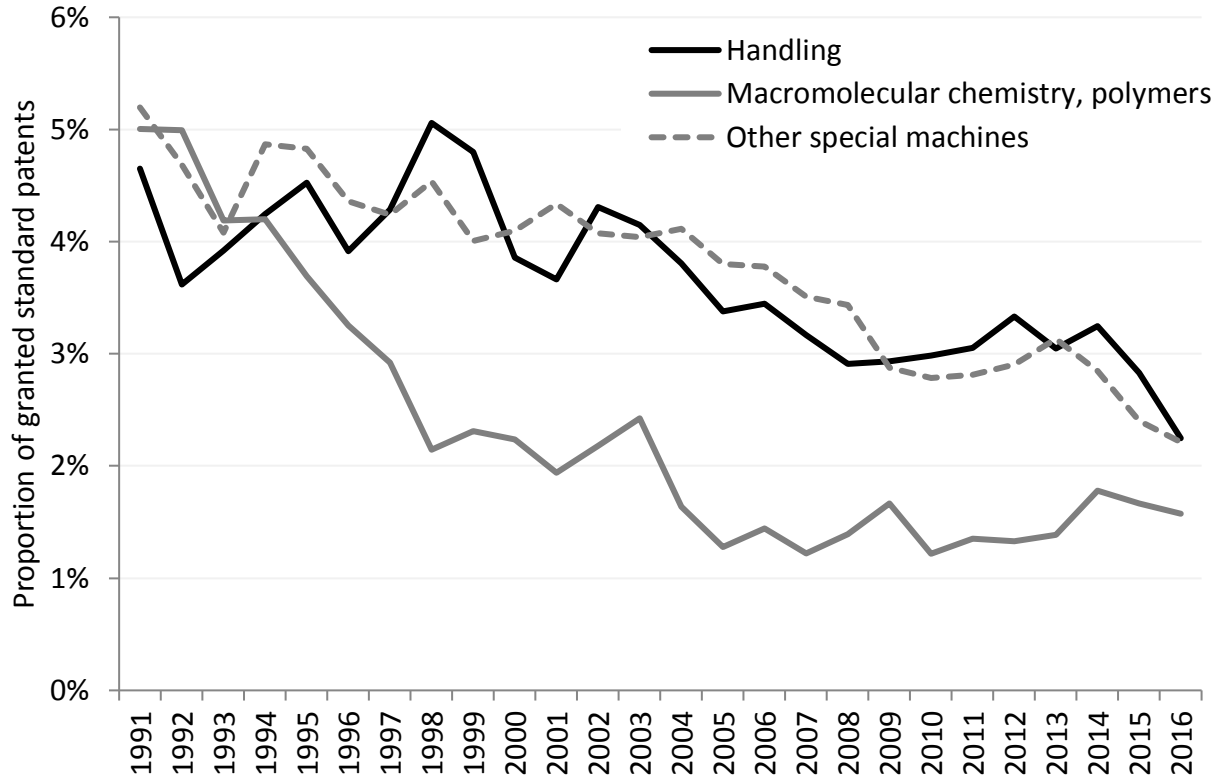
Standard patent trends: We computed the proportion of standard patents granted by technology field to see if there is any change in the relative proportion of technology fields among granted patents since 1990. Overall, there has been relatively more patents granted in the medical technology; computer technology; IT methods for management; and biotechnology fields since 1990, as seen in Figure 2.

Figure 2: Growing proportion of granted standard patents in Australia by technology field



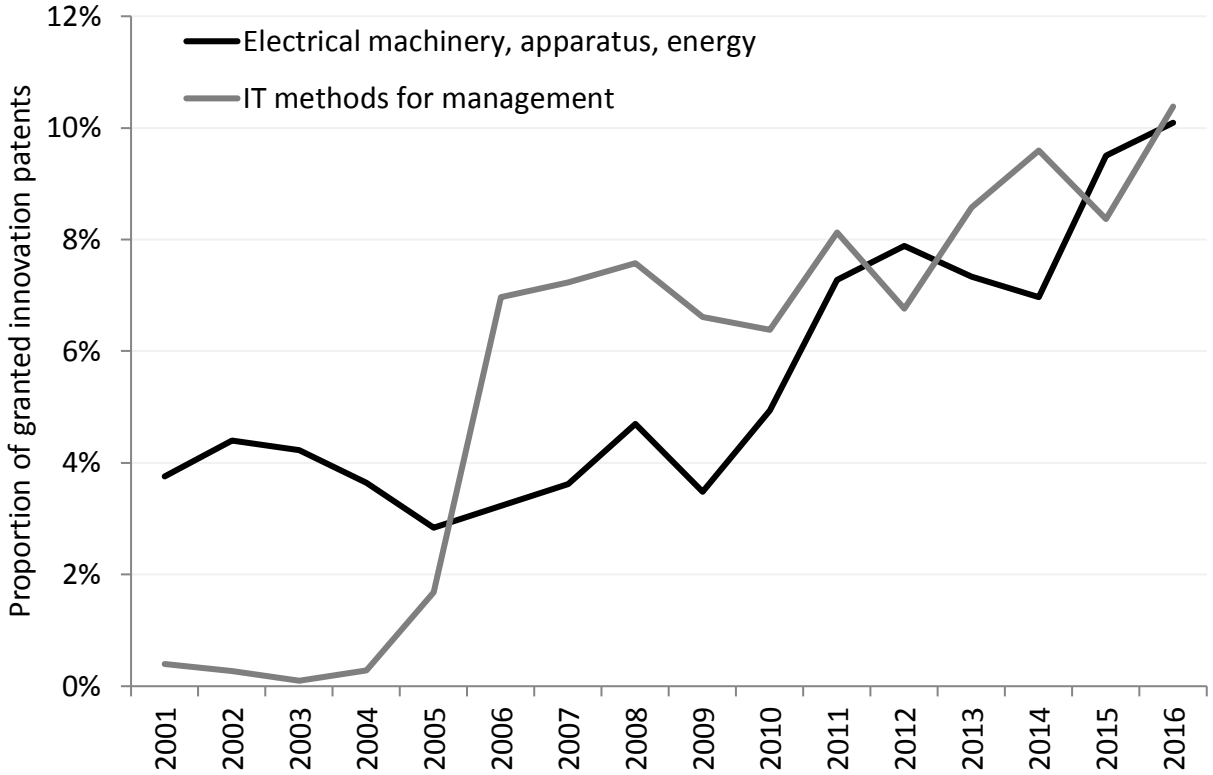
Technology fields which have experienced a relative drop as the proportion of grants include: other special machines; macromolecular chemistry; polymers; and handling fields as shown in Figure 3.

Figure 3: Falling proportion of granted standard patents in Australia by technology field



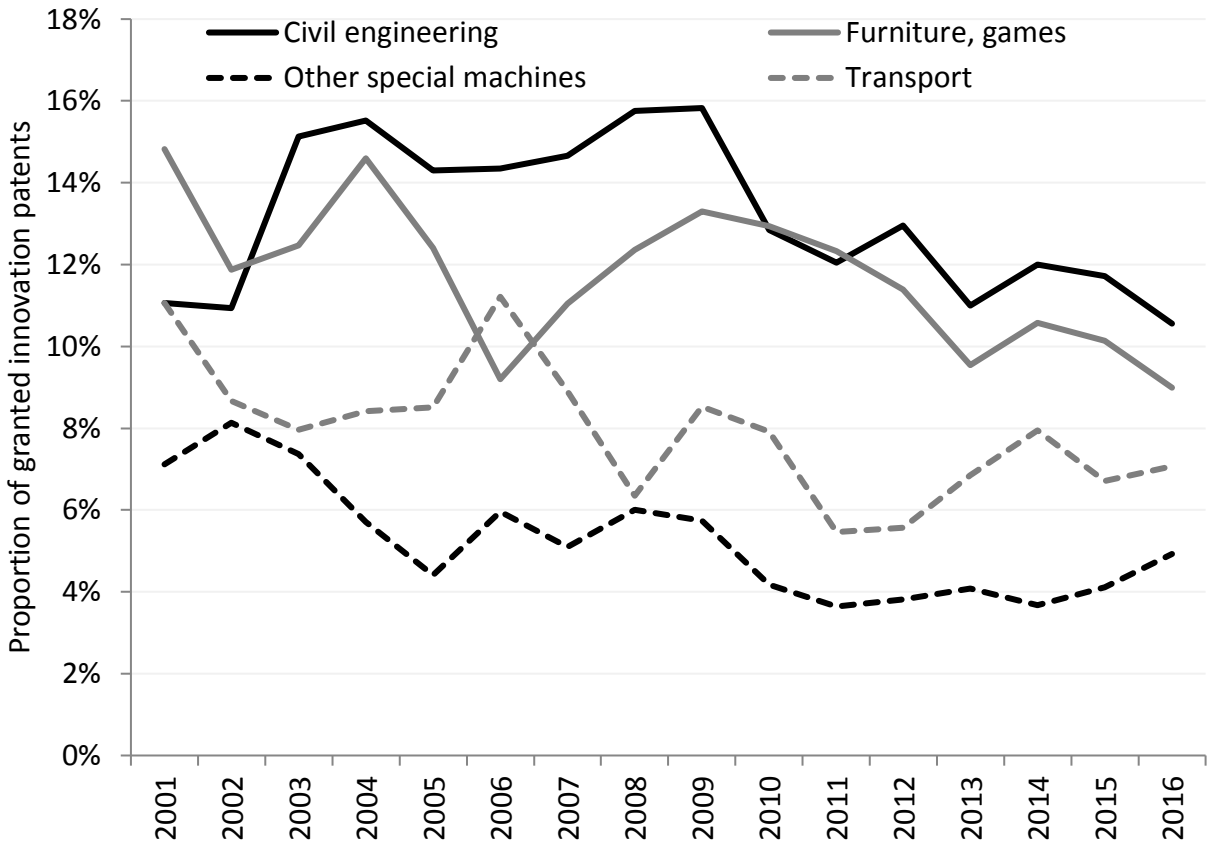
Innovation patent trends: Based on innovation patent filings, electrical machinery; apparatus; energy and IT methods for management fields are technology fields which have trended up since 1990 as shown in Figure 4.

Figure 4: Growing proportion of granted innovation patents in Australia by technology field



A falling proportion of granted innovation patents were in the technology fields for: civil engineering; furniture; games; other special machines; and transport throughout the same time period, as shown in Figure 5.

Figure 5: Falling proportion of granted innovation patents in Australia by technology field



c) Industry sectors of granted patents

Using Australian patent applicants' Australia and New Zealand Standard Industrial Classification (ANZSIC) code from the Australian Business Registry, it is possible to show the industry coverage for granted patents. We are able to derive the ANZSIC code for 77 per cent of all Australian applicants that are registered firms.

Table 3 shows the number of times a firm from an ANZSIC code was granted a patent between 1990 and 2016. If a firm was granted more than one patent, they will be counted than one time, and if more than one firm were listed as applicants on a granted patent, all firms on the application are counted.

Table 3: Granted Australian patent applicants 1990-2016 by industry sector

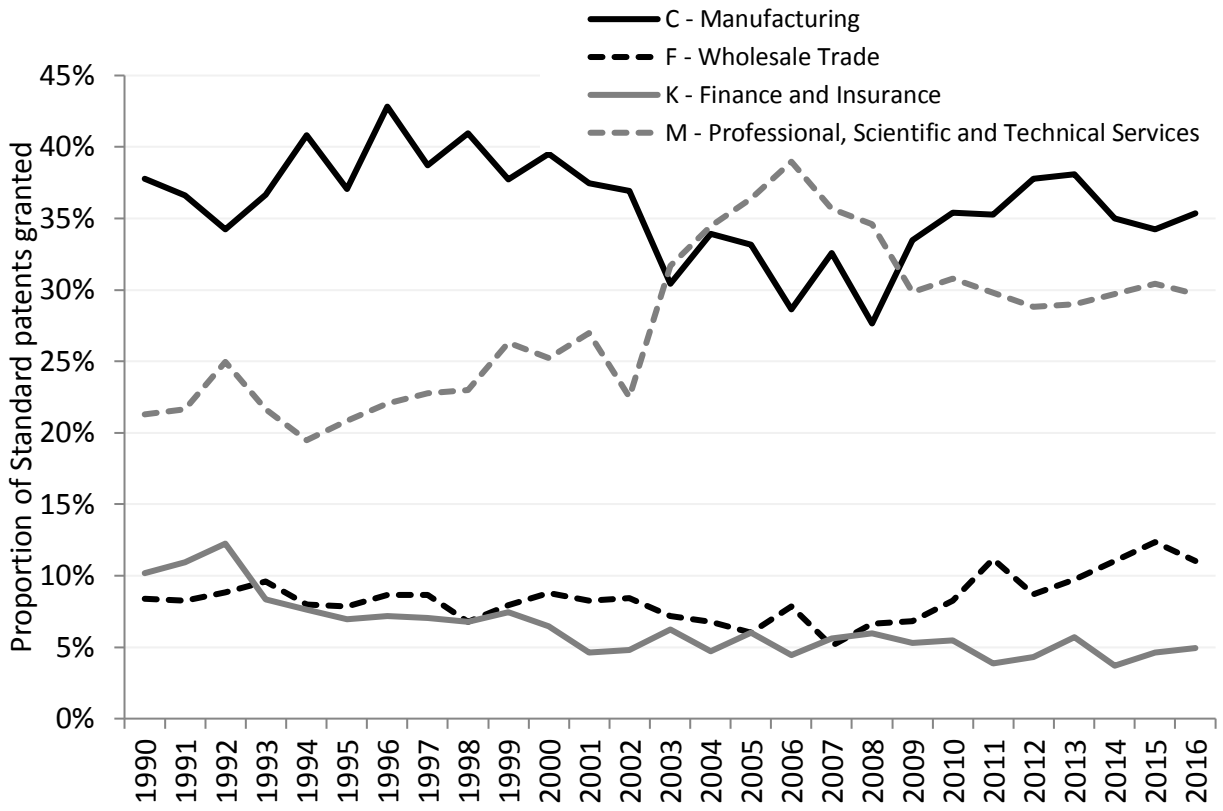
ANZSIC Sector	Innovation	Petty	Standard	Total
C - Manufacturing	1,377	278	6,546	**8,201**
M - Professional, scientific and technical Services	947	94	5,248	**6,289**
F - Wholesale trade	763	73	1,596	**2,432**
K - Finance and insurance	335	70	1,084	**1,489**
L - Rental, hiring and real estate services	206	26	811	**1,043**
P - Education and training	55	4	906	**965**
E – Construction	239	37	471	**747**
G - Retail trade	214	11	241	**466**
S - Other services	111	10	180	**301**

Q - Health care and social assistance	51	2	246	**299**
J - Communication services	118	10	170	**298**
R - Arts and recreation services	73	4	202	**279**
D - Electricity, gas and water supply	72	3	167	**242**
N - Administrative and support services	96	10	128	**234**
B – Mining	31	1	138	**170**
O- Public administration and safety	39	7	120	**166**
I - Transport and storage	50	1	106	**157**
H - Accommodation, cafes and restaurants	17	0	15	**32**
Total	**4,794**	**641**	**18,375**	**23,810**

Trends: A strong positive trend is observed for granted standard patents to firms in the professional, scientific and technical services sector between 1994 and 2006, moving from 21 per cent of grants in 1990 to a peak of 39 per cent in 2006. After the peak in 2006, there is a slight decline and the proportion of granted patents to the professional, scientific and technical services sector has stabilized around 30 per cent of all grants since 2009. There is a slightly positive trend in standard patents granted to the wholesale trade sector, particularly in the past ten years.

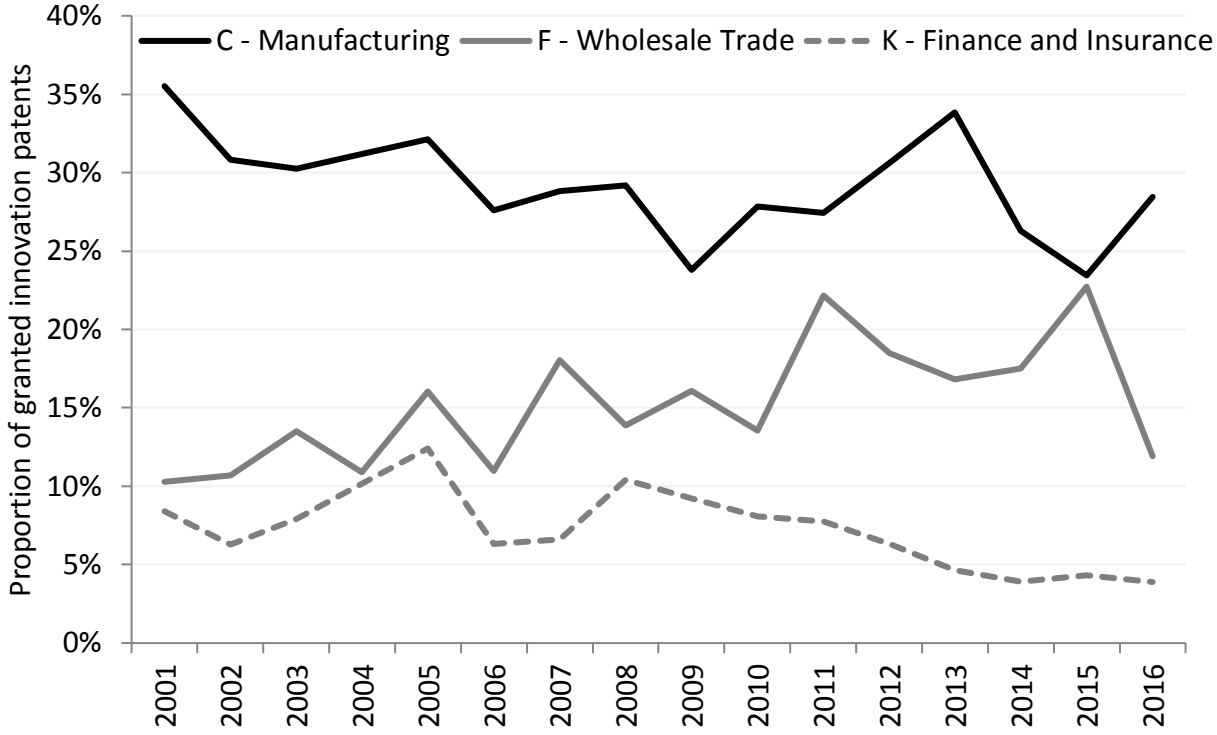
The manufacturing sector makes up the majority of granted patents, except between 2003 and 2008 when it was the professional and technical service sector. For both manufacturing and the finance and insurance sector, there was a slight decline in standard patents granted over the whole period from 1990-2016, as illustrated in Figure 6.

Figure 6: Proportion of granted Australian standard patent applicants by industry sector



Similarly for innovation patents, the manufacturing as well as the finance and insurance sectors have experienced a slight decrease in the relative number of innovation patents granted since 1990. Wholesale trade is the only sector in innovation patents that has a positive trend in the data although the growth rate seems to be minimal, as illustrated in Figure 7.

Figure 7: Proportion of granted Australian innovation patent applicants by Industry sector



2. Licensing information

IP Australia does not have a complete record of all licensed technologies acquired by residents in Australia, nor do we collect information on licenses relating to IP rights granted in other jurisdictions, or the money paid for licensing. IP rights holders can register their licenses with IP Australia, and we provide this to the National Personal Property Securities Register, available at https://www.ppsr.gov.au/. According to IP Australia's databases 1,139 licenses were recorded between 1990 and 2016.

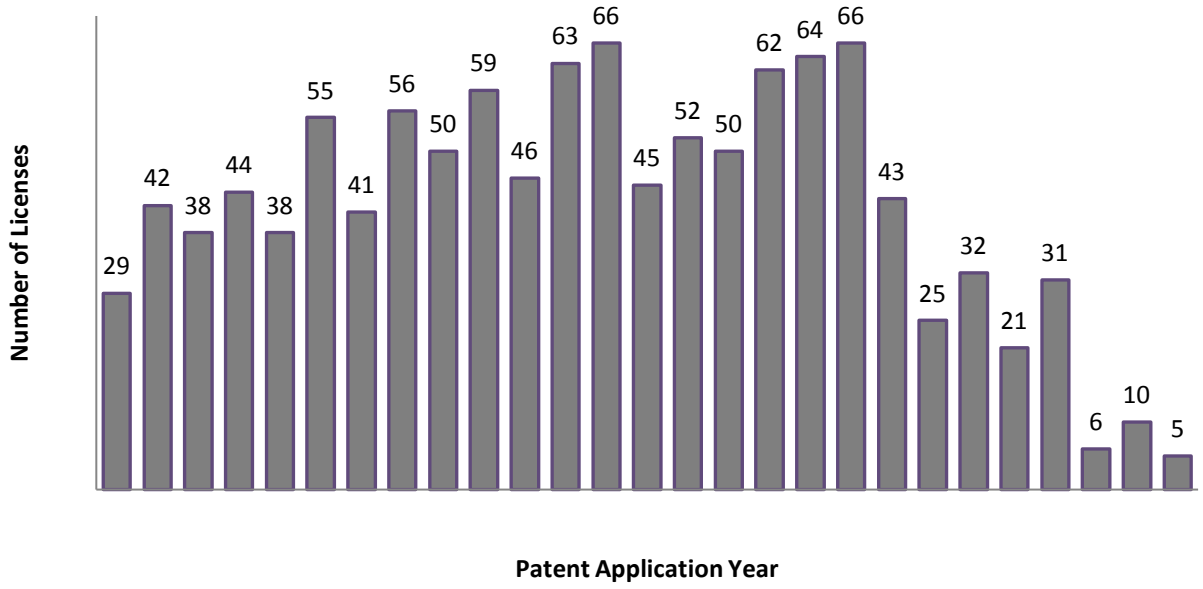
It is important to note that recording license details with IP Australia is optional, and only granted rights can be registered. This could explain the low numbers and the drop in the later years as rights may not yet have been granted. Table 5 shows the available data, noting Australian applicants.

Table 5: Number of licenses recorded in IP Australia by patent type

Application Year	Innovation	Petty	Standard	Total	Australian applicant
1990	0	0	29	**29**	15
1991	0	1	41	**42**	12
1992	0	2	36	**38**	9
1993	0	0	44	**44**	18
1994	0	3	35	**38**	18
1995	0	3	52	**55**	17
1996	0	2	39	**41**	13
1997	0	3	53	**56**	14
1998	0	0	50	**50**	11
1999	0	3	56	**59**	10
2000	0	4	42	**46**	15
2001	1	2	60	**63**	19
2002	1	0	65	**66**	11
2003	4	0	41	**45**	6
2004	1	0	51	**52**	11
2005	6	0	44	**50**	7
2006	2	0	60	**62**	6
2007	1	0	63	**64**	8
2008	0	0	66	**66**	6
2009	4	0	39	**43**	2
2010	5	0	20	**25**	4
2011	16	0	16	**32**	4
2012	9	0	12	**21**	8
2013	9	0	22	**31**	1
2014	4	0	2	**6**	3
2015	10	0	0	**10**	1
2016	5	0	0	**5**	0
Total	**78**	**23**	**1,038**	**1,139**	**249**

Trends: The number of registered licenses has a positive trend for patents filed between 1990 and 2002 (an increase from 29 licenses in 1990 to 66 licenses in 2002) as shown in Figure 8. There was a drop of 30 per cent in 2003 then steady growth peaking with 66 licenses for patents filed in 2008. There has been significantly lower number of licenses recorded between 2009 and 2016. This is because recent patent applications are less likely to have been granted and are therefore less likely to have a license agreement in place yet.

Figure 8: Number of licenses recorded in IP Australia



Technology field

We use the WIPO Technology Fields, derived from the IPC, to analyse the field of research/type of technology associated with each licensed patent. There are 35 technology fields across which licenses are distributed in Table 6.

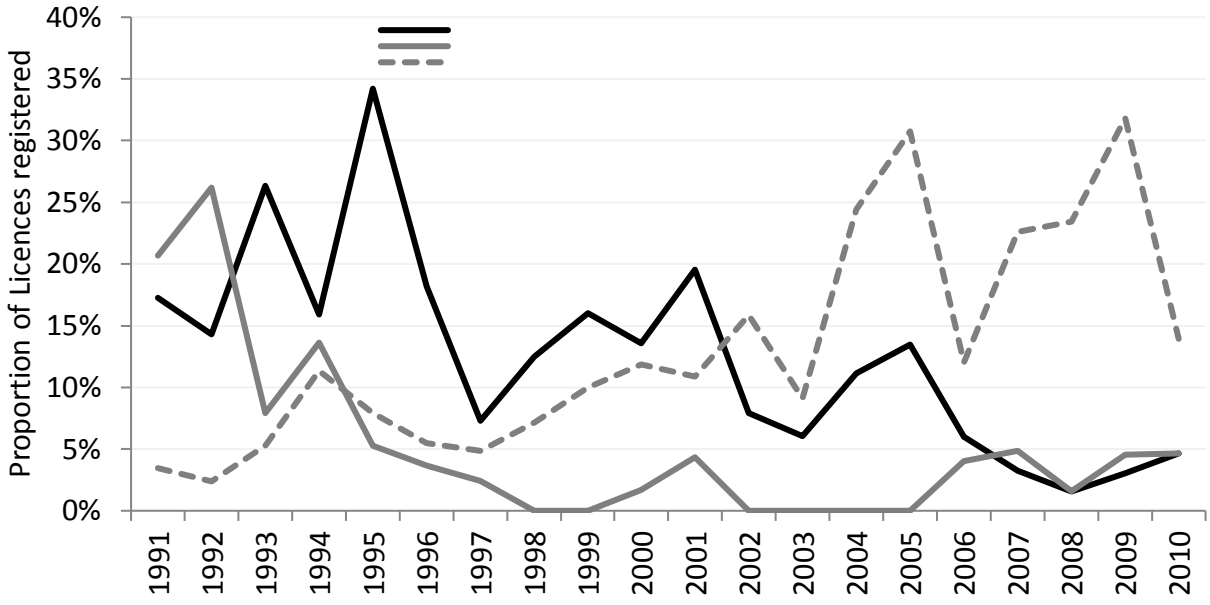
Table 6: Number of licenses recorded in IP Australia by technology field

Technology Field	Number of Licenses
Medical technology	149
Civil engineering	124
Organic fine chemistry	121
Pharmaceuticals	119
Furniture, games	50
Handling	46
Chemical engineering	45
Optics	45
Biotechnology	44
Electrical machinery, apparatus, energy	38
Other special machines	38
Textile and paper machines	34
Basic materials chemistry	33
Measurement	27
Computer technology	20
Mechanical elements	20
Analysis of biological materials	19
Transport	17
Environmental technology	15
Control	14
Machine tools	13
Audio-visual technology	12
Other consumer goods	12

Food chemistry	11
Macromolecular chemistry, polymers	11
Surface technology, coating	11
Engines, pumps, turbines	10
Materials, metallurgy	10
Telecommunications	8
Thermal processes and apparatus	7
Digital communication	5
IT methods for management	4
Basic communication processes	3
Micro-structural and nano-technology	1
Semiconductors	1
Unknown	2
Total	**1,139**

Trends: Some notable trends are observed in the civil engineering; handling; and medical technology fields. The proportion of licenses in civil engineering gradually declines for applications filed after 1995. The proportion of licenses in handling technology experienced a sharp decrease for applications filed between 1991 and 1995, moving from more than 20 per cent of licenses to five per cent or less of the total since 1995. Medical technology gradually increases from 1997 onwards. There is no noticeable change in trends observed in the remaining fields.

Figure 9: Proportion of licenses by technology field 1990-2010



Note that we excluded the observations from 2011 to 2016 for the trend analysis, as these have significantly lower number of licenses recorded, due to the time to grant and settle a license for a patent.

Industry sectors of license applicants

We looked at the patent applicants' ANZSIC codes to analyse the industry coverage of the license holders. Out of 1,139 licenses recorded, 249 of them have applicants of Australian origin. We were able to identify ANZSIC codes for 172 out of 249 licenses. The industry sectors with licenses registered between 1990 and 2016 are listed below. Due to the small sample size, it is difficult to perform trend analysis.

Table 7: Number of licenses recorded 1990-2016 by top five industry sectors

Rank	ANZSIC Classification	Number of Licenses	Percentage
1	**C - Manufacturing**	70	41%
2	**M – Professional, Scientific and Technical Services**	44	26%
3	**K – Finance and Insurance**	16	9%
4	**F – Wholesale Trade**	10	6%
=5	**L – Rental, Hiring and Real Estate Services**	8	5%
=5	**P – Education and Training**	8	5%
7	**B - Mining**	4	2%
8	**S - Other Services**	3	2%
=9	**D - Electricity, Gas and Water Supply**	2	1%
=9	**N - Administrative and Support Services**	2	1%
=11	**E - Construction**	1	1%
=11	**G - Retail Trade**	1	1%
=11	**J - Communication Services**	1	1%
=11	**O- Public Administration and Safety**	1	1%
=11	**Q - Health Care and Social Assistance**	1	1%
	Total	172	100%